formula concerning space and never again claimed (in the texts we know) that space is the *aggregate* of its parts.[127]

It may be added that, throughout this deep transformation of the notion of space, Leibniz preserved the idea that the metaphysical foundation of space is divine immensity, so that the act of abstraction producing space is by no means arbitrary but well founded in the essence of things. In some, but not all, of the texts on divine immensity written after 1688, Leibniz regarded God as the foundation of the order or relation among things which constitutes space according to the new definition (*fundamentum ordinis seu relationis spatium constitutentis*).[128] As is evident, this was very distant from Newton's and Clarke's conceptions of immensity.

In sum, by the mid-1690s (and possibly earlier) Leibniz's late theory of space had been fully developed, and it displayed all the main features that were later discussed in the correspondence with Clarke. Space was for Leibniz an abstract and ideal order of possible situational relations, grounded on God's immensity.

The public diffusion of Leibniz's new theory of space, however, occurred much later. In the early 1690s, Leibniz hesitated in communicating his still developing ideas even to his closest correspondents.[129] In the following years, and especially from the turn of the century, he became bolder, and his definition of space as an order of coexistence was unfailingly repeated in both private writings and philosophical exchanges. Leibniz's collected works, by Gerhardt and others, witness dozens of passages from the later

[127] As we have seen, Leibniz had already stated that the whole space precedes its parts in a couple of texts from 1676, and then reasserted at other times that any *continuum* has 'indeterminate parts' (see above, notes 74 and 100). Therefore, the 1695 thesis was not entirely new. Yet it became stable, and even prominent, in Leibniz's writings from the 1690s. The same point about ideality seems to be stated in LH XXXVII, 5, Bl. 134, which may date from 1695 as well.

[128] The passage quoted comes from the 1698 notes for Gabriel Wagner, in A II, 3, N. 249, 701. The topic is also discussed in the undated passage on space quoted in note 114. The theme of God's immensity is, however, recurrent in Leibniz's mature years.

[129] The correspondence between Leibniz and Fardella is especially telling. Fardella repeatedly asked about space, and Leibniz was particularly elusive on the topic—at first. The correspondence, indeed, shows a veritable *crescendo* in the course of the 1690s. In 1691, Leibniz simply answered Fardella that space is not a substance, in the same way as time is not one ('L'Espace selon moy n'est pas une substance, non plus que le temps. Et je crois qu'effectivement il ne se trouve point de vuide; quoyque l'essence de la matière ne consiste pas dans l'étendue'; A II, 2, N. 116, 426). In 1695, Leibniz still claimed that 'space is no more a thing than time is ('Spatium non magis rem esse judico, quam tempus'; A II, 3, N. 11, 28). In 1696, he confessed to Fardella that space and time are relations ('Spatium et tempus non sunt substantiae sed relationes reales'; A II, 3, N. 72, 194). In 1698 he finally told him that space is nothing more than an order of coexistence ('Interim vacuum non admitto, et spatium non concipio ut substantiam immobilem, quod plerosque facere video, sed ut tempus; ita ut nihil aliud sit quam ordo quidam coexistendi'; A II, 3, N. 170, 437).

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years in which his new views on space are mentioned and expounded. Leibniz called the relationality of space a κυρία δόξα (fundamental doctrine) of his philosophy.[130]

Leibniz, however, did not publish anything on the topic—despite having multiple opportunities to do so—and his views remained unknown beyond the circle of his correspondents. In particular, Leibniz kept his views on space out of the great bulk of anti-Newtonian essays on physics. Thus, no mention of the new definition of space as a system of relations was made in the *Schediasma de resistentia medii* (1689), *Tentamen de motuum coelestium causis* (1689), *Phoranomus* (1689), *De praestantia systematis Copernicanis* (1689), *De causa gravitatis* (1690), or the unpublished *Dynamica* (1689–90), the *Essay de dynamique* and the essays on the estimation of forces and the composition of motions (1691–3), up to the *Specimen dynamicum* (1695). The same is true of Leibniz's 1693 correspondence with Newton and the 1694 correspondence with Huygens on Newton's theory of motion.[131] A short reference to space as an order of coexistence was only made by Leibniz in an article on different topics published in 1702.[132]

Newton and Clarke, who were well acquainted with Leibniz's writings, were clearly taken off guard when in 1716 they were first confronted with Leibniz's definition of space, as probably were many other readers of the Leibniz–Clarke correspondence. Pierre Des Maizeaux, who after Leibniz's death edited a famous expanded edition of the correspondence by collecting

[130] To De Volder, April 1702 (GP II, 240; Lodge, *De Volder*, 238). In the same period, Leibniz told Johann Bernoulli that his theory of space as an order of coexistence explained the 'deepest origins' and the 'most internal reasons' of space (1 July 1704; in A III, 9, N. 196, 552).

[131] See above, note 12, and the paragraphs to which it is appended, for a brief discussion of the uses of the word '*spatium*' in these works. This seems to be true also for the drafts of the great *Dynamica*. In this work, Leibniz sometimes calls 'absolute space' the four-dimensional trace of a moving body (i.e. the 'product' of the body itself and his trajectory), but this has no relation with Newton (cf. GM VI, 268). In the *Phoranomus*, Leibniz simply recalls having long relinquished substantial space (something he did in 1672): see especially A. Robinet, 'G. W. Leibniz. Phoranomus seu de potentia legibus naturae', *Physis*, 28 (1991), 429–541 and 797–885, at 810–11; and G. Mormino, E. Pasini, and F. Piro (eds.), *G. W. Leibniz. Dialoghi filosofici e scientifici* (Milan: Bompiani, 2007), 800–1. In a related text from 1689, Leibniz claimed that since space is something imaginary (he did not say relational), then motion is not absolute but rather relational (Couturat, *Opuscules*, 590). In an unpublished note in the First Part of the *Specimen dynamicum*, Leibniz called space 'something not absolute' (H. G. Dosch, G. W. Most, and E. Rudolph [eds.], *Leibniz. Specimen Dynamicum* [Hamburg: Meiner, 1982], 22), and in the Second (wholly unpublished) Part he claimed that space is a being of reason (GM VI, 247; Dosch, Most, and Rudolph, *Specimen*, 40). In no text did he call it an 'order of coexistence'. I thank Andrea Costa and Enrico Pasini for providing me with a draft of their forthcoming critical edition of the *Dynamica*.

[132] This is an essay that appeared in the *Histoire critique de la république des lettres*, in which Leibniz replied to Bayle (GP IV, 568).

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a few of Leibniz's philosophical essays dealing with topics touched in the exchange, could find *nothing* concerning space.[133] For a long time, the Leibniz–Clarke correspondence remained the unique text documenting Leibniz's theory of space. As a consequence, the development of Leibniz's ideas on space and his manifold sources, from Patrizi to Newton, remained hidden from the sight of historians.

Leibniz's reluctance to put his novel views on space into print may have had manifold grounds, and we need once again to wait for the publication of Leibniz's works from the 1690s to make a final statement. His views on space seem to have evolved in the early years of that decade and to have only settled in the mid-1690s. If this is the case, we should not imagine that the new theory of space was already available to Leibniz when he was composing his anti-Newtonian treatises. Rather, the theory itself was created, adjusted, and perfected in the course of the years in which Leibniz was in constant contact with Newton's works, and it should be regarded as a final outcome, rather than a premise, of Leibniz's engagement with Newton's natural philosophy. It is also possible that Leibniz had already formulated the relational theory when he was writing against Newton but decided that advancing such views would alienate him from the Cartesians and the Aristotelians (and many others) whom he might have hoped to have as allies against the British. In general, Leibniz was happy to employ the weakest possible hypothesis to defend a theory, and in this case he may have felt that the standard claim that space is not a substance was more than enough to—provisionally—ground his physical theory. Yet, when his philosophy of space was fully developed and his target more focused—in the correspondence with Clarke—Leibniz deployed his new ideas in battle.

Newton's *Principia*, with its theory of absolute space, presented Leibniz with an enormous challenge. In the years 1689–93, Leibniz attempted (and failed) to offer a reply to Newton's natural philosophy by envisioning an alternative system of the world. One of Leibniz's first reactions to the *Principia*, however, was to respond to Newton's theory of space. In previous years, he had already rejected the Neoplatonic metaphysics underlying the substantiality of space. Now he realized that such a metaphysics might be used to ground a physics of incredible explanatory power. Space, which had played a fundamental role in Leibniz's own natural philosophy in the 1660s and

[133] See Leibniz's fragments published in P. Des Maizeaux, *Recueil de diverses Pièces sur la Philosophie, la Religion Naturelle, l'Histoire, les Mathématiques, &c. par messieurs Leibniz, Clarke, Newton & autres Auteurs célèbres* (Lausanne: Bousquet, 1759), which never mention space.

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